

## Claims

- [c1] A Pullulan free edible film composition comprising:
- a.) an effective amount of a film forming agent; and
  - b.) an effective amount of an antimicrobial agent wherein the antimicrobial agent comprises a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & peppermint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil.
- [c2] The composition of claim 1, wherein the film forming agent comprises a mixture of maltodextrin, a filler and a hydrocolloid.
- [c3] The composition of claim 2, wherein the maltodextrin comprises about 5 wt.% to about 60wt.% of the edible film.
- [c4] The composition of claim 2, wherein the maltodextrin comprises about 20 wt.% to about 40 wt.% of the edible film.

- [c5] The composition of claim 2, wherein the hydrocolloid comprises about 10 wt.% to about 50 wt.% of the edible film.
- [c6] The composition of claim 2, wherein the hydrocolloid comprises about 20 wt.% to about 30 wt.% of the edible film.
- [c7] The composition of claim 2, wherein the filler comprises about 5 wt.% to about 30 wt.% of the edible film.
- [c8] The composition of claim 2, wherein the filler comprises about 15 wt.% to about 25 wt.% of the edible film.
- [c9] The composition of claim 2, wherein the hydrocolloid comprises a material selected from the group consisting of a natural gum, a biosynthetic gum, a natural seaweed, a natural plant extrudate, a natural fiber extract, a gelatin, a biosynthetic process starch, a cellulosic material, an alginate, pectin and combinations thereof.
- [c10] The composition of claim 9, wherein the natural gum comprises a gum selected from the group consisting of natural seed gum, guar gum, locust gum, tara gum, gum Arabic, ghatti gum, agar gum and zanthan gum.
- [c11] The composition of claim 9, wherein the alginate comprises sodium alginate or calcium alginate.

- [c12] The composition of claim 9, wherein the natural seaweed comprises a carrageenan.
- [c13] The composition of claim 2, wherein the filler comprises a food-grade bulk filler selected from the group consisting of microcrystalline cellulose, a cellulose polymer, magnesium carbonate, calcium carbonate, ground limestone, a silicate, clay, talc, titanium dioxide, a calcium phosphate and combinations thereof.
- [c14] The composition of claim 13, wherein the cellulose polymer comprises wood.
- [c15] The composition of claim 14, wherein the silicate comprises magnesium or aluminum silicate.
- [c16] The composition of claim 13, wherein the calcium phosphate comprises mono-calcium phosphate, di-calcium phosphate, or tri-calcium phosphate.
- [c17] The composition of claim 1, wherein said combination of essential oils comprises about 1wt.% to about 10 wt.% of the edible film.
- [c18] The composition of claim 1, wherein said combination of essential oils comprises about 8 wt.% of the edible film.
- [c19] The composition of claim 1, wherein said combination of

essential oils comprises about 5 wt.% of the edible film.

[c20] The composition of claim 1, wherein the said combination of essential oils comprises up to about 25 wt.% of the edible film.

[c21] The composition of claim 1, further comprising an effective amount of a medicament.

[c22] The composition of claim 21, wherein the medicament comprises an oral cleansing or breath freshening compound selected from the group consisting of a pH control agent, inorganic components for tartar or caries control, a breath freshening agent, an anti-plaque/anti-gingivitis agent, a saliva stimulating agent, a pharmaceutical agent, a nutraceutical agent, a vitamin, a mineral and combinations thereof.

[c23] The composition of claim 22, wherein the pH control agent comprises urea.

[c24] The composition of claim 22, wherein the inorganic components for tartar or caries control comprise phosphates or fluorides.

[c25] The composition of claim 22, wherein the breath freshening agent comprises zinc gluconate.

[c26] The composition of claim 22, wherein the anti-

plaque/anti-gingivitis agent comprises chlorhexidine, CPC or triclosan.

[c27] The composition of claim 22, wherein the saliva stimulating agent comprises a food acid.

[c28] The composition of claim 27, wherein the food acid comprises an acid selected from the group consisting of citric, lactic, maleic, succinic, ascorbic, adipic, fumaric, tartaric and combinations thereof.

[c29] The composition of claim 1, further comprising an effective amount of a softening agent.

[c30] The composition of claim 29, wherein the softening agent comprises about 0 wt.% to about 20 wt.% of the edible film.

[c31] The composition of claim 29, wherein the softening agent comprises about 2 wt.% to about 10 wt.% of the edible film.

[c32] The composition of claim 29, wherein the softening agent comprises a plasticizer including a compound selected from the group consisting of sorbitol, glycerin, polyethylene glycol, propylene glycol, hydrogenated starch hydrolysates, corn syrup and combinations thereof.

- [c33] The composition of claim 1, further comprising an effective amount of a coloring agent.
- [c34] The composition of claim 1, further comprising an effective amount of a flavoring agent.
- [c35] The composition of claim 34, wherein the flavoring agent comprises about 0.1 wt.% to about 20 wt.% of an edible film.
- [c36] The composition of claim 34, wherein the flavoring agent comprises about 10 wt.% to about 15 wt.% of the edible film.
- [c37] The composition of claim 34, wherein the flavoring agent comprises a material selected from the group consisting of essential oils, synthetic flavors, fruit essences, anise, flavor oils with germ killing properties and mixtures thereof.
- [c38] The composition of claim 37, wherein the essential oils are selected from the group consisting of citrus oil, spearmint oil, mint oil, clove oil, oil of wintergreen and combinations thereof.
- [c39] The composition of claim 37. wherein the flavor oils with germ killing properties comprise menthol, eucalyptol, thymol and combinations thereof.

- [c40] The composition of claim 1, further comprising an effective amount of an emulsifying agent.
- [c41] The composition of claim 40, wherein the emulsifying agent comprises lecithin, (C10–C18) fatty acids, mono-acyl glycerides, di-acyl glycerides, ox bile extract, polyglycerol esters, polyethylene sorbitan esters, propylene glycol, sorbitan monopalmitate, sorbitan monostearate, sorbitan tristearate, enzyme modified lecithin, hydroxylated lecithins and combinations thereof.
- [c42] A method of oral cleansing by applying a Pullulan-free edible film to the oral cavity, wherein the edible film comprises:
- a.) an effective amount of a film forming agent; and
  - b.) an effective amount of an antimicrobial agent wherein the antimicrobial agent comprises a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & peppermint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil.
- [c43] The method of claim 42, wherein said combination of essential oils comprises at least about 1 wt% of the edi-

ble film.

- [c44] The method of claim 42, wherein said combination of essential oils comprises about 5 wt.% of the edible film.
- [c45] The method of claim 42, wherein said combination of essential oils comprises an amount up to about 25% wt.% of the edible film.
- [c46] The method of claim 42, wherein the film forming agent comprises a mixture of a maltodextrin, a filler and a hydrocolloid.
- [c47] The method of claim 46, wherein the hydrocolloid comprises about 5 wt.% to about 60 wt.% of the edible film.
- [c48] The method of claim 46, wherein the hydrocolloid comprises about 10 wt.% to about 50 wt.% of the edible film.
- [c49] The method of claim 46, wherein the filler comprises about 5 wt.% to about 30 wt.% of the edible film.
- [c50] The method of claim 46, wherein the hydrocolloid comprises a material selected from the group consisting of a natural gum, a biosynthetic gum, a natural seaweed, a natural fiber extract, a gelatin, a biosynthetic process starch, a cellulosic material, an alginate, pectin and combinations thereof.



- [c51] The method of claim 50, wherein the natural gum comprises a gum selected from the group consisting of natural seed gum, guar gum, locust gum, tara gum, gum Arabic, ghatti gum, agar gum, xanthan gum and combinations thereof.
- [c52] The method of claim 50, wherein the alginate comprises sodium alginate or calcium alginate.
- [c53] The method of claim 50, wherein the natural seaweed comprises a carrageenan.
- [c54] The method of claim 46, wherein the filler comprises a food-grade bulk filler selected from the group consisting of microcrystalline cellulose polymer, magnesium carbonate, calcium carbonate, ground limestone, a silicate, clay, talc, titanium dioxide, a calcium phosphate and combinations thereof.
- [c55] The method of claim 54, wherein the cellulose polymer comprises wood.
- [c56] The method of claim 54, wherein the silicate comprises magnesium or aluminum silicate.
- [c57] The method of claim 54, wherein the calcium phosphate comprises mono-calcium phosphate, di-calcium phosphate or tri-calcium phosphate.

- [c58] The method of claim 42, wherein the edible film further comprises one or more of a medicament, a softening agent, a coloring agent, a flavoring agent and an emulsifying agent.
- [c59] The method of claim 42, wherein the edible film delivers at least about 0.1 wt.% of said combination of essential oils to the oral cavity.
- [c60] The method of claim 42, wherein the edible film delivers at least about 0.01 wt.% of said combination of essential oils to the oral cavity.
- [c61] The method of claim 42, wherein the edible film delivers at least about 0.005 wt.% of said combination of essential oils too the oral cavity.
- [c62] A method of making a Pullulan-free film comprising:
- a.) forming an aqueous solution that includes a maltodextrin, a hydrocolloid, and a filler;
  - b.) adding an effective amount of an antimicrobial agent to the aqueous solution, wherein the antimicrobial agent comprises a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & pep-

permint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil and;

c.) drying the aqueous solution to form a dry edible film.

[c63] The method of claim 62, wherein adding an effective amount of an antimicrobial agent comprises adding sufficient combination of essential oils such that the dry edible film comprises at least about 1 wt.% of said combination of essential oils.

[c64] The method of claim 62, wherein adding an effective amount of an antimicrobial agent comprises adding sufficient combination of essential oils such that the dry edible film comprises up to 25 wt.% combination of essential oils.

[c65] The method of claim 62, wherein forming an aqueous solution comprises adding sufficient maltodextrin such that the dry edible film comprises about 5 wt.% to about 50 wt.% maltodextrin.

[c66] The method of claim 62, wherein forming an aqueous solution comprises adding sufficient hydrocolloid such that the dry edible film comprises about 10 wt.% to about 50 wt.% hydrocolloid.

[c67] The method of claim 62 wherein forming an aqueous solution comprises adding sufficient filler such that the dry

edible film comprises about 5 wt.% to about 30 wt.% filler.

- [c68] The method of claim 62, wherein forming an aqueous solution further comprises adding one or more of a medicament, a softening agent, a coloring agent, a flavoring agent, and an emulsifying agent.
- [c69] The method of claim 62, further comprising heating the aqueous solution to a temperature of about 40°C to about 60°C prior to drying the aqueous solution.
- [c70] A treatment for reducing the number or activity of bacteria in the oral cavity comprising the steps of:
- a.) providing an edible film composition comprising a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & peppermint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil in and amount sufficient to kill or deactivate oral bacteria; and
  - b.) causing a person in need of the treatment to consume that edible film composition whereby the bacteria in the oral cavity of the person is reduced or inactivated by the treatment.

- [c71] A method of oral cleansing by consuming a chewing gum comprising;
- a.) a gum base;
  - b.) a flavor;
  - c.) a sweetener; and
  - d.) a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & peppermint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil.
- [c72] The method of claim 71, wherein the amount of said combination of essential oils is present up to about 5.0% by weight of the chewing gum composition.
- [c73] The method of claim 71, wherein the amount of said combination of essential oils is present up to about 1.0% by weight of the chewing gum composition.
- [c74] The method of claim 71, wherein the amount of said combination of essential oils is present up to about 0.25% by weight of the chewing gum composition.
- [c75] The method of claim 71, wherein the amount of said combination of essential oils is present up to about

0.01% by weight of the chewing gum product.

- [c76] The method of claim 71, further comprising a food acceptable zinc and copper salts of acids selected from the group consisting of gluconic acid, lactic acid, acetic acid, citric acid and combinations thereof.
- [c77] The method of claim 71, further comprising pyrophosphate or polyphosphate.
- [c78] The method of claim 71, wherein said combination of essential oils is encapsulated.
- [c79] The method of claim 71, wherein said combination of essential oils is spray dried.
- [c80] The method of claim 71, wherein said chewing gum composition is coated.
- [c81] The method of claim 80, wherein said combination of essential oils is present in said coating.
- [c82] The method of claim 81, wherein said combination of essential oils is encapsulated.
- [c83] The method of claim 71, further comprises a high intensity sweetener selected from the group consisting of , sucralose, aspartame, NMP derivatives such as neotame, salts of acesulfame, alitame, saccharin and its

salts, cyclamic acid and its salts, glycyrrhizinate, dihydrochalcones, thaumatin, monellin, and combinations thereof.

[c84] The method of claim 71, further comprising a medication.

[c85] The method of claim 71, further comprising an active agent.

[c86] The method of claim 71, further comprising a cooling agent selected from the group consisting of menthol, ethyl p-menthane carboxamide, N,2,3 - trimethyl-2-isopryl-butanamide, menthyl glutarate FEMA 4006, menthyl succinate, menthol PG carbonate, menthol EG carbonate, menthyl lactate, menthone glyceryl ketal, menthol glyceryl ether, N-tert-butyl-p-menthane-3-carboxamide, p-menthane-3-carboxylic acid glycerol ester, methyl-2-isopryl-bicyclo (2.2.1), heptane-2-carboxamide, menthol methyl ether and combinations thereof.

[c87] The method of claim 71, formulated to deliver at least 0.005% concentration said combination of essential oils to the oral cavity.

[c88] The method of claim 71, further comprising an oral health ingredient.

- [c89] A method of oral cleansing by consuming a confectionery product containing an antimicrobial agent.
- [c90] The method of claim 89, wherein said antimicrobial agent is a combination of essential oils selected from the group of pairs consisting of cinnamic aldehyde & salicylaldehyde, cinnamic aldehyde & citral, salicylaldehyde & citral, cinnamic aldehyde & peppermint oil, cinnamic aldehyde & spearmint oil, salicylaldehyde & peppermint oil, salicylaldehyde & spearmint oil and, citral & spearmint oil.
- [c91] The method of claim 90, wherein said combination of essential oils is present in an amount up to 3% by weight of the confectionery product.
- [c92] The method of claim 90, wherein said combination of essential oils is present in an amount of about 1% by weight of the chewing gum product.
- [c93] The method of claim 90, wherein the form of said confectionery product is a hard candy.
- [c94] The method of claim 93, wherein said hard candy contains about 1.0% to about 4% moisture by weight of the confectionery product.
- [c95] The method of claim 90, wherein the form of said con-



fectionery product is a chewing candy.

[c96] The method of claim 90, wherein the form of said confectionery product is a coated chewy center candy.

[c97] The method of claim 90, wherein the form of said confectionery product is a tabletted candy.

[c98] he method of claim 90, further comprising a color.

[c99] The method of claim 90, further comprising a flavor.